1LD 005176441

EPA Region 5 Records Ctr.

303419

The Drake Oak Brook Plaga

2215 York Road, Suite 114 Oak Brook, Illinois 60521

(312) 323-2162



REMEDIAL RESPONSE BRANCH

September 24, 1984

Mr. Terry Ayers, P.E. Quality Assurance Manager Land Permit Section Illinois Environmental Protection Agency 2200 Churchill Road Springfield, IL 62706

RE: Central Quality Industrial Soil and Groundwater Phase II Report

Dear Terry:

We are enclosing the Central Quality Industries Soil and Groundwater Sampling and Analysis Phase II Report. We proceeded with the Phase II program as developed and discussed at our meeting on February 15, 1984. We feel that the additional monitoring wells, soil borings, sampling and analysis adequately address concerns over potential soil and water contamination. As the Phase II Report indicates, there has been no long-term impact in the surface water or groundwater resulting from past disposal practices.

If you have any questions or comments concerning the Phase II Report, please contact me.

Sincerely,

John J. Yates, P.E.

JJY/hk Enclosure

cc: R.D. Hewes, CQI - Enclosure R. Bartelt, Remedial Response Branch Chief, U.S. EPA Region V, Chicago - Enclosure

SOIL AND GROUNDWATER SAMPLING AND ANALYSIS Phase II Report

Submitted to:

Central Quality Industries 900 South Division Street Polo, Illinois 61064

By:

Yates & Auberle 2215 York Road, Suite 114 Oak Brook, Illinois 60521

312/323-2162

September 12, 1984

TABLE OF CONTENTS

		Page
1.0	Introduction and Review of Phase I	1
2.0	Scope of Study - Phase II	3
3.0	Soils Sampling And Analysis	6
4.0	Surface Water Sampling And Analysis	9
5.0	Groundwater Monitoring And Analysis	11
	Conclusions	16
	Appendices	17
	A - Drilling and Monitoring Well Information	
	B - Soil Sampling Analysis Results	
	C - Stream Sample Analysis Results	
	D - Groundwater Isocons	
	E - Groundwater Sample Analysis Results	

1.0 Introduction and Review of Phase I

Recognition of past waste disposal practices stimulated investigation by Central an Quality Industries (CQI) into potential soil and groundwater plant site in Polo, Illinois. contamination at the Beginning ſn 1983 a general survey was performed on groundwater at and near an area where some land disposal of plant wastes had occurred. results of this Phase I assessment are presented in Soil and Groundwater Sampling And Analysis: Phase I Report, February 28, 1984.

The Phase I study revealed above "background" levels of some chemical parameters in the soil, groundwater and small surface stream. Although no parameter was observed in alarmingly high concentrations, further investigation was required to characterize adequately the soil conditions at the plant. Of particular interest were the metals Chromium and Lead which were observed in the soil, groundwater and surface stream (ditch). A primary conclusion of the initial study was that an expanded investigation was necessary. The scope of the second phase was described in the Phase I report. This expanded investigation was

conducted in the spring and summer of 1984. The results are presented and discussed in this Phase II report.

2.0 Scope of Study - Phase II

The initial investigation of potential soil groundwater contamination at CQI was extremely Many questions were answered important. Xylene was eliminated as a concern); and some results were inexplicable with available data. (Where were ditch contaminants originating?) the Sites were 1 n conjunction with the Illinois Environmental Protection Agency in an attempt to better characterize the extent and characteristics of groundwater contamination at CQI.

borings were performed at some 10 strategic locations on the CQI property. Sites were selected define better the area of apparent contamination establish clearer well to background as characteristics for comparison. Additionally, each stratified three boring at predetermined was elevations to ascertain the vertical distribution of soil parameters. Each of the four borings made in Phase I was repeated with an adjacent and stratified sample in Phase II as part of the total of ten.

The four groundwater monitoring wells developed in I were supplemented with three new wells in II. One set of wells (MW-4 and MW-4D) was established to collect discrete samples from two different aquifers. With the exception of MW-4D, each of the wells was installed in the uppermost aquifer. Well MW-4D was specifically drilled into the second aquifer so that analyses could determine whether any cross-contamination between aquifers had Approximately three weeks after well occurred. development, groundwater samples were collected from all seven wells.

As mentioned, one of the more perplexing results of the Phase I study was the characteristic of the small stream or ditch which flows along the southern boundary of the CQI plant site. To address this question three sampling points along the ditch were chosen representing water quality upstream of any plant influence, midstream near an inactive discharge pipe and immediately downstream of the plant. Samples were collected and analyzed on the same days as the groundwater program.

Quality assurance procedures were carefully followed

throughout this program and in one area procedural improvements to the Phase I study were possible. This is discussed more fully in the groundwater monitoring section. Raw data reports from the well drilling and analytical contractors are presented in the Appendices.

3.0 Soils Sampling And Analysis

recommendation following the Phase key Ţ investigation was an expanded investigation of soil characteristics at the CQI plant. On April 13, 1984 new soil borings were performed at strategic locations throughout the plant site. Borings were made with a truck-mounted rotary drill rig equipped with a hydraulic head. Soil samples were obtained using 4-inch diameter flight augers. Drilling tools thoroughly cleaned and rinsed between boreholes were prevent cross-contamination. to Samples promptly placed in jars for transport to analytical laboratory. Proper chain-of-custody procedures and records were maintained throughout the soil sampling process. The location of each boring is shown on the site diagram in Appendix A.

Each soil boring was stratified into three discrete samples taken at the surface, minus 2.5 feet and minus 5.0 feet. Samples were analyzed for the metals Chromium and Lead and indicator parameters pH and Alkalinity. Additionally two separate laboratory analytical methods were used to examine metal concentrations. Extraction Procedure (E.P.) Toxicity

was employed to ascertain the leaching potential of any metals present. Rigorous acid digestion was used to determine the total concentration of each metal in the sample. The results of all soil analyses are included in Appendix B.

A comparison of soil pH and Alkalinity among all boring locations reveals no distinct pattern either among sites or in vertical distribution. Concentrations of Chromium and Lead, according to the E.P. Toxicity analyses, were below detectable levels in all samples. Only when analyzing samples by acid digestion were significant metal concentrations observed.

background levels of Chromium in the soil at CQI The acid digestion) are in the range of 15-20 ppm. (by Two surface level soil samples concentrations of 91 ppm and 610 ppm at locations B-13 and B-8A, respectively. All other values both surface and subsurface samples are close to in The source of this Chromium may have background. been past waste dumping in the area of these borings. Fortunately the contamination appears to be quite stable and isolated. It is of little threat to groundwater as evidenced by no elevated concentrations below the surface and below detection in extraction procedure leachate.

The concentrations of lead in the soil samples varied widely when subjected to acid digestion. The highest level-455 ppm was found in the surface sample at sample that yielded relatively high B-13: a concentrations of Chromium as well. The much lower, but next highest value of 69 ppm was found at the surface of boring B-11 in the northeast area of the plant. As observed in the Phase I study, vehicle exhausts may contribute to surface contamination at locations adjacent such to roadways. As with Chromium, Lead in soil appears to have little impact groundwater. EP Toxicity analyses subsurface concentrations are quite low and are consistent with background levels in this type of soil.

4.0 Surface Water Sampling And Analyses

The normal surface water at the CQI plant is confined to a small ditch which flows from West to East along the southern border of the property. Samples of water from the ditch were collected at three points on May 18, 1984. The samples were sealed on-site, transported to the laboratory and analyzed on May 22nd. Results of these analyses are presented in Table I and Appendix C.

Of greatest significance in the surface water study was the relatively high quality of water with respect to the parameters investigated - Chromium, Lead, COD, TDS, pH, Specific Conductance and Alkalinity. Little change in any of these parameters was observed as the water passed through the CQI property and changes in contamination which did occur tended toward improvement. A summary of results is shown in Table 4-1.

Surface Water (Ditch) Concentrations At COI May 18, 1984

Table 4-1

	Upstream (mg/l)_	Midstream (mg/l)	Downstream (mg/l)
Chromium (Total)	0.005	0.001	L.T. 0.001
Lead	0.006	0.005	0.003
COD	105	37	27
Alkalinity	444	370	458
TDS	660	540	576
рН	7.0	7.3	7.7

5.0 Groundwater Monitoring And Analysis

As part of the Phase I investigation of groundwater at the CQI facility, four monitoring wells were installed at strategic locations on the plant site. These are identified as MW-1 through MW-4 and are shown in Appendix D. The results of Phase I revealed that additional monitoring locations would be required to characterize adequately the distribution of any groundwater contamination at the site. Further, one well into a deeper aquifer was desirable to ascertain whether any cross-contamination between aquifers had occurred.

On April 30, 1984 three new wells were developed at the locations shown in Appendix A. Borings had been performed with a truck-mounted rotary drill rig equipped with a hydraulic head. The boreholes were advanced using 4-inch diameter flight augers. Drilling tools were cleaned between borings using soap and water, and rinsed with water and isopropyl alcohol to prevent cross-contamination of boreholes.

The monitoring wells consist of bottom-capped 10-foot sections of well screen joined by 2-inch I.D.

Schedule 40 PVC plastic well riser pipe casing. The is a 2-inch I.D. Schedule 40 PVC plastic well screen screen with a slot size of 0.01 inch. A filter pack consisting of clean sand and gravel was installed at the bottom of the well to within 2 to 3 feet of A around surface. 2-foot layer of pelletized bentonite seal was then placed above the filter pack. well, a cap with bolt and Upon completion of the padlock was installed. Details of monitoring well construction are included in Appendix A.

The three new wells as shown in Appendix A, are designated MW-4D, MW-5 and MW-6. Well MW-4D is located adjacent to well MW-4 but was drilled into the second level aquifer. The screen was inserted to a depth of 27 feet, well below the "perched" groundwater which was found in the 5 ft. - 10 ft. region.

All seven wells were sampled on May 18, 1984 using individual PVC plastic bailers. Samples were placed in jars with preservatives and transported to the analytical laboratory. A chain-of-custody record was maintained with the samples.

Each groundwater sample was analyzed for TDS, COD, pH, Specific Conductance, Alkalinity, Chromium and Lead. Samples were passed through a 45-micron filter prior to analysis. The 45-micron filter was not used in the Phase I analyses. The coarser filter used in the Phase I analyses permitted some sediment to pass Treatment with acid released some of the metals from the sediment giving higher readings. When finer 45-micron filter was used, levels dropped significantly. concentration This result clearly indicated that the metals present were not water soluble.

Chromium

The concentrations of total Chromium found in the groundwater are shown in the laboratory reports in Appendix E. In addition isocons for this parameter were developed as shown in Plate 7 of Appendix D. A small increase in Chromium concentration was observed as the groundwater moves down gradient to the South end of the plant site. The highest measured concentration, however, was 0.003 mg/l which is well below the drinking water standard of 0.05 mg/l.

Lead

Measured lead concentrations ranged from 0.003 mg/l to 0.007 mg/l with no apparent pattern among well locations. The highest concentration was well below the drinking water standard of 0.05 mg/l and no information exists to suggest cause for concern. Isocons of lead concentrations are shown in Plate 8, Appendix D, and laboratory data are presented in Appendix E.

Total Dissolved Solids/Specific Conductance

Samples were analyzed for Total Dissolved Solids (TDS) and Specific Conductance (S.C.) in an attempt to establish a TDS/S.C. relationship. The results demonstrate that sound correlation exists between these parameters. A simple regression of TDS on S.C. yields the following relationship:

S.C. (uohms/cm) =
$$1.3857 \times TDS (mg/1) + 6.2078$$

or as a useful linear relationship

TDS $(mg/1) = 0.72 \times S.C. (uohms/cm)$

Using this equation, the concentration of dissolved inorganic salts in the groundwater can be estimated in the field with a conductivity meter. This capability may prove useful in the event any subsequent monitoring is undertaken.

isocons for Total Dissolved Solids are shown in Plate 9 οf Appendix D. Some increase above background levels may exist in the Southeast segment of the property. There is no drinking water standard for this parameter and the maximum observed concentration of 1024 mg/l is not unusual Illinois. As shown in the laboratory report Appendix E, much of the TDS is in the form of Alkalinity which, if necessary, is easily treated with a water softener.

Conclusions

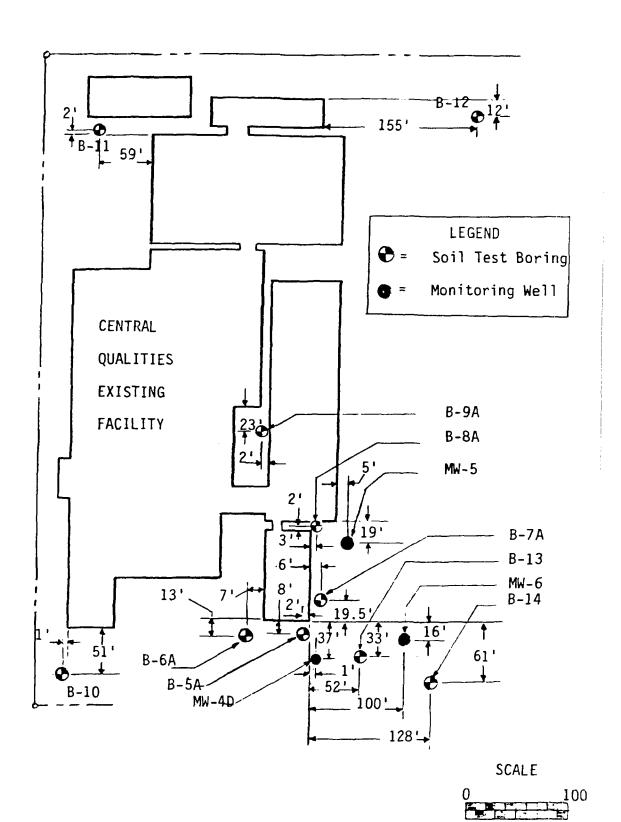
The results of the Phase II investigation were quite informative, particularly when coupled with the Phase report. In general, any previous waste dumping activity at COI has caused no long term impact in the surface water or groundwater at the Polo facility. surface level soil contamination by Chromium and persists; but their low concentrations and Lead non-leaching, form do not stable, present a significant concern. It is possible that any soil contamination at CQI which was conducive to leaching flushed from the soil prior was to these investigations. Further, the results from the deeper monitoring well, MW-4D show no apparent contamination at that level. The groundwater quality at the CQI site is relatively stable and should remain so with proper management practices.

APPENDICES

-17-

APPENDIX_A

Drilling and Monitoring
Well Information



MONITORING WELL AND BORING LOCATION DIAGRAM CENTRAL QUALITY INDUSTRIES POLO, ILLINOIS



Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport Des Moines, IA
Kansas City Wichita, KS
Oklahoma City Tulsa, OK

RAH 1"=100 6-9-84 783563-1

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS	:	Split Spoon—1%" I.D., 2" O.D., unless otherwise noted	PS	:	Piston Sample
ST	:	Shelby Tube—2" O.D., unless otherwise noted	ws	:	Wash Sample
PA	:	Power Auger	FT	:	Fish Tail
HA	:	Hand Auger	RB	:	Rock Bit
DB	:	Diamond Bit — 4 in. N. B	BS		Bulk Sample
AS	:	Auger Sample	PM	:	Pressuremeter
HS	:	Hollow Stem Auger	DC	:	Dutch Cone
VS	:	Vane Shear			

Standard "N" Perietration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL WCI DCI AB	:	Water Level Wet Cave In Dry Cave In After Boring	WS : WD : BCR : ACR :		While Sampling While Drilling Before Casing Removal After Casing Removal
AB	:	After Boring	ACR :	:	After Casing Removal

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In low permeability soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence of ground water elevations must be sought.

DESCRIPTIVE SOIL CLASSIFICATION:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, or clayey silts if they are cohesive, and silts if they are slightly cohesive or non-cohesive. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, granular solls are defined on the basis of their relative in-place density and fine grained soils on the basis of their consistency and plasticity. Example: Clayey silt, trace sand moderately plastic, stiff; silty fine sand, trace gravel, medium dense.

GRAIN	SIZE	TERM	IINOL	OGY

RELATIVE DENSITY OF GRANULAR SOILS:

Daladius Danale.

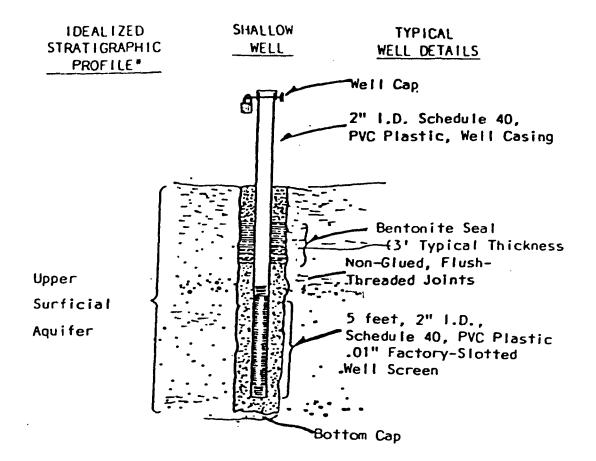
Major		N-Blows/ft.	Relative Density		
Component Of Sample	Size Range	0-3	Very Loose		
Boulders	Over 8 in. (200mm)	4-9 10-29	Loose Medium Dense		
Cobbles	8 in. to 3 in. (200mm to 75mm)	30-49 50-80 80 +	Dense Very Dense Extremely Dense		
Gravel	3 in. to #4 sieve		·		
	(75mm to 2mm)	CONSISTENCY OF	COHESIVE SOILS:		
Sand	#4 to #200 sieve (2mm to .074mm)	Unconfined Compressive Strength, Qu, psf	Consistency		
Silt or Clay	Passing #200 sieve (0.074mm)	◄ 500 500- 1,000 1,000- 2,000	Very Soft Soft Medium		
RELATIVE P	ROPORTIONS	2,000- 4,000 4,000- 8,000	Stiff Very Stiff		
Descriptive Term(s)		8,000-16,000	Hard		
(Of Components Also Present in Sample)	Percent of Dry Weight	▶ 16,000	Very Hard		

Hate	1-10	PLASTICITY OF	FINE GRAINED SOILS
Little	10-20	Term	Plasticity Index
Some	20-35	None to slight	0- 3
And	35-50	Slight Moderate	4~ 7 8~25
		High	▶ 2 5

TERRACON CONSULTANTS, INC.—

1_10

MONITORING WELL INSTALLATION DETAILS FIGURE 4



^{*} Idealized stratigraphic profile shown; for specific profiles encountered, refer to the attached boring logs.

<u></u>											N//N	MULA		
1 0	WNE	R	·					<u>_</u> _	OG OF I		CHITECT-E	MW4d		
			กมล	N ITY	INDUST	TRIES				4	ATES &			
<u> </u>	TE										OJECT NA			
	POL	0, I	LLIN	1015						N	ONITORI	NG WELL INSTALI	LATION	
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft. ²	Water Content-%	Dry Density- lbs./ft.3	Unified Class. Symbol	Depth	Elevation		Descripti PIPE = 99.1 E ELEVATION = 9		MONITORING WELL DETAIL
	PA Jis							C1 71				FILL-CLAYEY SI TRACE ORGANICS Brown	LT	
2	PA AS								5 - - - 10			SILTY CLAY Black & Gray		
3	PA JAS				\ 			МН	111111111111111111111111111111111111111			SILTY CLAY, TRA SAND AND GRAVED Brown	ACE_	
4	AS.							SM	20			SILTY. FINE SAN Brown	ID .	
5	AS PA							CL	7 17 17 17 17 17 17		_	SANDY SILTY CLA FRACE GRAVEL Gray	<u>Y</u> ,	
6	AS							<u>CL</u>			(30.0')	BOTTOM OF BORIN	G.),
<u> </u>								1	=					
												YPES IN SITU. THE TRANSITION		
WATER LEVEL OBSERVATIONS							}		con Con		•	BORING STARTED		12-84
WL								Des Moines Storm Lake, IA						
W.L W.L		0.7	5-18	B.C.R	<u>-1</u>	A.C.R	4		Omahi Oklahoma City	a, NE		APPROVED RKI	FOREMA	

						· <u>. </u>		L	OG OF	BORIN	IG NO.	MW5		والبراج منظوراتها الإبالات وبالمواسدات	
ō	WHE	R								AR	CHITECT-E	NGINEER			
		RAL	QUA	LITY	INDUST	RIES					ATES & A				
ļ	ITE									j	PROJECT NAME				
	<u>P()LC</u> I		<u>LL IN</u>	OIS	Τ			-	<u> </u>	<u> </u> M	MONITORING WELL INSTALLATION				
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft. ²	Water Content-%	Dry Density- Ibs./ft.3	Unified Class. Symbol	Depth	Elevation	TOP OF SURFACE	Description PIPE = 100.6 ELEVATION = 97		MONITORING WELL DETAIL	
2	2A 2A 2A 12A							CL_			(5.0') (10.0') (15.0')	SANDY SILTY CLAY FRACE GRAVEL Gray Brown	ASS (,		
	THI	E STRA	TIFICATI	ON LINES F	REPRESENT	THE APPRO	XIMATE E	OUNDA	RY LINES BE	TWEEN SO	DIL AND ROCK T	YPES IN SITU THE TRANSITION	MAY BE GRA	ADUAL.	
	WAT	ER L	EVEL	OBSE	RVATIO	NS			con Con		•	BORING STARTED		-12-84	
W.L.	10	.0	w.s.	DR W.D		- A.B	닠	D	Falls Cedar es Moines :	Storm Lak	e, fA	BORING COMPLETE		-12-84	
W.L.	ļ	~		B.C.R	2.	A.C.R			Kansas City Omah		KS	RIG 2A	FOREM		
W.L	l r	1 /-	10	\			1		Oklahoma Cit		OK	APPROVED DVI	HOR #7	94563_1	

- ..

								ì	OG OF	BORIN	NG NO	MW6		ای بدی چمپرچند بستاد ندرستا	
-0	V/NE	R									ARCHITECT-ENGINEER				
		AL C	QUAL I	ITY IN	IDUSTR1	IES				Y/	ATES & A	UBERLE			
S	TE		.,	·- <u></u>						PR	OJECT NA	ME		يه پیروس ما کارستان کی در استان	
PC	<u>)LO</u> ,		<u> INO I</u>	<u> </u>	r	· · · · · · · · · · · · · · · · · · ·		,		MC	ONITORIN	TION			
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.²	Water Content-%	Dry Density- lbs./ft.3	Unified Class. Symbol	Depth	Elevation		Description PIPE = 98.1 E ELEVATION = 9		MONITORING WELL DETAIL	
3	PA PA PA AS							QL QL			(5.5') (9.0')	FILL-CLAYEY SI TRACE SAND, GR AND ORGANICS Dark Brown CLAYEY SILT, SLIGHTLY ORGAN Black to Dark CLAYEY SILT Gray Brown BOTTOM OF BORING	IC Brown		
	<u> </u>]		_=						
	``` ``HE	STRAT	DECATIO	ON LINES R	EPRESENT 1	THE APPRO	XIMATE B	OUNDA	RY LINES BE	TWEEN SC	DIL AND ROCK T	YPES IN-SITU THE TRANSITION	MAY BE GRA	DUAL	
1	WATI	ER L	EVEL	OBSE	RVATIO	NS			con Con			BORING STARTED	4-1	2-84	
W L.	8	.0 v	W.S. (	DR W.D	8.0	A.B.	-	Cedar F	alls Cedar es Moines S	Rapids	Davenport	BORING COMPLETE	ED 4-1	2-84	
W.L.				B.C.R		A.C.R.	.]		Kansas City Omah	Wichita,		RIG 2A	FOREMA	AN JAF	
W.L.	5	5 /	E 10	3-84)			1		Ollian Oklahoma Cit		OK	APPROVED RKI	JOB #78		

	LOG OF BORING NO. 5A											
	VNE		~					_		- 1	RCHITECT-ENGINEER	
S	ENTE TE	RAL	QUAL	ITY I	NDUSTR	(IES	<del></del>				YATES & AUBERLE ROJECT NAME	
,		, IL	LINO	)IS							MONITORING WELL INSTALLATION	
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.²	Water Content-%	Dry Density- Ibs./ft.3	Unified Class. Symbol	Depth	Elevation	Description SURFACE ELEVATION = 96.7	
I	AS.							CL			CLAYEY SILT	
	PA		<u> </u>	<u></u>			<u> </u>		三		Dark Brown	
	PA								=			
	7.5		<u> </u>	<b> </b>			<u> </u>	CI	5 =		(5.0')	
											BOTTOM OF BORING	
									<del> </del>		SOIL AND ROCK TYPES IN-SITU, THE TRANSITION MAY BE GRADUAL	
WATER LEVEL OBSERVATIONS									acon Con Falls Cedar		Davenoord	
W.L.	N.L.         None         W.S. OR W.D.         None         A.B.           V.L.         B.C.R.         A.C.R.								es Moines : S Kansas City	Wichita	eke, IA	
W.L					1		7	c	Omah Dklahoma Cit		0/4	

W.L

<u> </u>	LOG OF BORING NO. 6A															
	IVNE										ARCHITECT-ENGINEER YATES & AUBERLE					
<b></b>	ENT	RAL	QUAI	ITY I	NDUSTI	RIES			·		PROJECT NAME					
ĺ		Ţi	LIN	710						1	MONITORING WELL INSTALLATION					
	JEO		1	1							T TOKIN	S WEEL INSTRUCT	11011			
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft. ²	Water Content-%	Dry Density- lbs./ft.3	Unified Class. Symbol	Depth	Elevation	SURFAC	Description  CE ELEVATION =				
	AS PA											FILL-MIXTURE	OF CL	AYEY SI	LT	
2	AS								三			AND CRUSHED	LIMEST	ONE,		
	PA								$\exists$		/4 51	Dark Brown				
3	_AS								5		(4.5') (5.0')	SEE NOIE #I	<del></del>		-	
									unlun			BOTTOM OF BO	RING			
									E		TOM	E #1:				
									hulmlun			CLAYEY SILT, Brown				
					EPRESENT RVATIO		DXIMATE I					PES IN-SITU. THE TRANSITION		4-13-84		
W.L.				OR W.D				Cedar I	Falls Cedar	Rapids I	Davenport	BORING COMPLETI		<del>4-13-84</del> 4-13-84		
W.L.	B.C.R. A.C.R. Kansas City													AN JAF		
W.L		D.C.R. A.C.R.									Tulsa OK APPROVED RKI JOB # 78				i 1	

<i>[</i>		·							00.05	2004	1C NO	8A	
	WNE	D							OG OF		CHITECT-E		
			ΩΠΔΙ	ז עדו	NDUSTE	RIFS					TES & AL		
	TIE		QC/A		NDOST				<del></del>		OJECT NAM		
P	01.0	. 11	LINO	210						- 1		WELL INSTALLA	TION
		T		Ĭ	~			Γ		1		- WEEE - 1110 - FIEEF	. 10.1
	ĺ	Distance	İ	Ì	ŧ			Li	1		l		
وا	<u>ج</u> ق	R Dis					<u>4.</u>	Class.	}			Description	nn.
<u> </u>	San	Type Sample Sampling Distanc Recovery Blows/ft. Unconfined Compressive Strength-lbs/ft.²						D 20	_	tion	İ	2030117110	<b></b>
Sample No.	Sampling Sampling Recovery Blows/ft Compres Strength						Dry Density- Ibs./ft.3	Unified Symbol	Depth	Elevation			
		S	ıπ	<u> </u>	1200	5	<u> </u>	200		ш		<u> </u>	
ļ.	ST	24	]			]			$\exists$		$\int_{1}^{1} (a - a) \int_{1}^{\frac{1}{2}}$	IMESTONE, Dark	Brown
				<del> </del>							7		
2	<u>ST</u>	18			ļ			CL				LAYEY SILT	
3	:ST	18		<u> </u>				CL	m hundum hundum fan		(5.0') ^B	rown to Gray Bi	rown
									$\exists$				
						i						OTTOM OF BORING	
									コ		Ь	UTTON OF BUKING	2
									<b>-</b>				•
									⇉				
' I	- 1								7				
	ļ												
			'					İ	Ξ				
· }								l	$\overline{}$				
							1		Ⅎ				
l										!			
1									$\exists$				
- 1	1							j	7				
									7				
	l								$\exists$				
			.										
1	1					1			ᆿ				
1	ł		1			}	- 1	1	_=				
1	ŀ	ł	1	i		į		İ	⇉				
	}			j	ļ	]			Juntinu				ļ
l	}	ł	}			Ì		1	7	l			j
													Ì
	l			}		- 1	ļ	1					
	}				}		}		=				}
		Ì	ł		ł		Ì		$\equiv$	Ì			Ì
1													
							<del></del>				<del></del>	PODING STARTER	
W.L.,	~ <del>~</del> ~~			OBSE	RVATIO		<b>-</b> 1		con Con alis Cedar			BORING STARTED BORING COMPLETE	4-13-84 D 4 13 84
W.L.	INC	חופ '			· <del></del>		-1		s Moines S (ansas City			RIG Hand Auger	
W.L.	B.C.R.								Omah kiahoma Cit		ок	APPROVED RKL	JOB #783563-1

								L	OG OF		NG NO. 9A			
1	WNE								RCHITECT-ENGINEER					
15	EYI	RAL	OUAL	TIA I	NDUSTI	RIES				Y A	ATES & AUBERLE ROJECT NAME			
Į.		, IL	LINC	)IS						4	MONITORING WELL INSTALLATION			
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Uncontined Compressive Strength-lbs./ft.²	Water Content-%	Dry Density- lbs./ft.3	Unified Class. Symbol	Depth	Elevation	Description  SURFACE ELEVATION = 100.1			
					Į						(1.0') SEE NOTE #1			
-1		24						CL			CLAYEY SILT			
2	ST	18			<u> </u>			CL			Dark Brown to Brown			
3	ST	18	•					CL	5_=		(5.0')	į		
	ST 18										BOTTOM OF BORING			
									TWEEN SC	NOTE #1:  FILL: CRUSHED LIMESTONE AND CLAYEY SILT Gray  OIL AND ROCK TYPES IN SITU. THE TRANSITION MAY BE GRADUAL				
	WAT	ER L	EVEL	OBSE	RVATIO	NS .	1	Terra	con Cor	nsultan				
WL	None w.s. or w.b. None A.B.							Cedar I	Falls Ceda: es Moines	Rapids	Davenport BORING COMPLETED 4-13-84			
W.L.	B.C.R. A.C.R.							1	Kansas City Omal	Wichita, na, NE	Hand Auger I. Wall JAF			
W.L	ł						1		Oklahoma Ci	ty Tuisa.	APPROVED RKL JOB # 783563	-1		

·													<del></del>	
								L	OG OF I			10		
И	WNE		OLIA	ITV 1	MOUCT	סזנס				CHITECT-E				
	TE	KAL	QUA	L. 1   1	INDUST	<u> </u>			<del></del>					
H		* 1	1 7 81	010						L	OJECT NAI		NSTALLAT	TON
	JLU	r	LLJN	12	r	r		,		Prior	TIORING	WELL IN	STALLAT	TON
Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft. ²	Water Content-%	Dry Density- Ibs./ft.3	Unified Class. Symbol	Depth	Elevation			Description	01.7
1_	_AS_										/1 5:\ ]	FILL-SIL	TY CLAY	AND CRUSHED
	PA		]	ļ	i				#		آ_((1.5	FILL-MIX	TURE OF	n & Gray CLAYEY SILT
2	PA AS PA							LL/	СН		14 011	AND SILT	Y CLAY,	Dark Brown &
3	AS	-	}	}	<b>}</b> -	<del>  </del>		CL	5_1		<del>                                     </del>	Brown	. II	
	_₩2			<del> </del>		<b></b>		سلما	1		(5.0')	SEE NOTE	#1	
									ılııdın				F BORIN	<b>G</b> ;
1									=		NOTE #	1:		
									hulmlun			CLAYEY S	ILT (TO	PSOIL)
									<b>=</b>		Ī	Black to	Dark B	rown
	ļ													
									1					
									3					
				'										
									=					
i	j			,					$\exists$					
			i						$\exists$					
i		İ							一目					
1					'	}			' ゴ					
	}								4					
									$\exists$					
ļ	ļ								=					
	,													
-									7					
Ì						-			7	ļ				
]									$\exists$					
									$\exists$					
1	THE	STRA	TIFICATI	ON LINES F	EPRESENT	THE APPRO	XIMATE E	OUNDA	RY LINES BE	TWEEN SO	PIL AND ROCK T	YPES IN-SITU TI	HE TRANSITION	MAY BE GRADUAL
	WATER LEVEL OBSERVATIONS								con Con			BORING !	STARTED	4-12-84
W.I.	No	ne	W.S.	OR W.D	. None		4	D	Falls Cedar es Moines S	Storm Lak	e, IA	<del></del>	COMPLETE	
W.L				B.C.R	<u>.l</u>	A.C.R	4		Kansas City Omah	a, NE			?A	FOREMAN JAF
W.L.,							1	(	Oklahoma Cit	y Tulsa	OK	APPROVE	D RKL	JOB #783563-1

								L	OG OF	BORIN	IG NO	11		
	WNE	R						CHITECT-E			<del></del>			
C	ENTF	RAL	QUAL	ITY II	NDUSTR	IES				Y	ATES & A	AUBERLE		
S	ITE									PR	PROJECT NAME			
P	<u>QLO</u> ,	IL	LINO	IS		····			M(	ONITORIN	IG WELL IN	STALLA	TION	
Sample No.	OType Sample	Sampling Distance	Recovery	Blows/H.	Unconfined Compressive Strength-lbs./ft.²	Water Content-%	Dry Density- Ibs./ft.3	Unified Class.	Depth	Elevation	SURFA	CE ELEVAT		
	PA							<u> </u>			ĺ	6" TOPS		
2	YZ.							CL			}	CLAYEY SIL	<u>T</u>	
	PΑ								$\exists$			Brown to [	Dark G	ray
<u></u>				ļ					, <del> </del>		(5.0')			
	AS											BOTTOM OF	BORIN	G
		.												
	ļ	l								j				
			j	}				]	$\exists$					
ł			1					į	ㅋ					
	ļ.				Ì	J	}	ļ						
			İ	, [				ļ		ĺ				
1							)	j	$\exists$					
	Ì					1	İ		-=					;
1	T)+(C	STRA	TIFICATI	ON LINES R	EPRESENT	THE APPRO	XIMATE E	ADNUO	RY LINES BE	TWEEN SO	IL AND ROCK T	YPES IN-SITU, THE T	FRANSITION	MAY BE GRADUAL
	WATER LEVEL OBSERVATIONS Terracon Cor										•	BORING ST	ARTED	4-12-84
W.I.	N	one	W.S.	OR W.D			-}	De	alls Cedar es Moines	Storm Lak	e, IA	BORING CO	MPLETE	<u></u>
W.L., W.L.				B.C.R	·1	A.C.R	-}		(ansas City Omah	a, NE		RIG 2A		FOREMAN JAF
₹¥ .1	L						<u> </u>		klahoma Cit	y Tuisa.	UK	APPROVED	RKI	JOB #783563-1

						<del></del>		L	OG OF	BORIN	IG NO. ]	2	ارها دورها الجه علي المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد المساحد ال	
	WNE		DIIAI	י עדו	MINITE	115			AR	CHITECT-E	NGINEER	والجبيب المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين الأحداث المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين المتعادلين ال		
	17.E	TAL_	QUAL	.117 1	NDUSTR	115			··		DJECT NAM			
ſ		, IL	LINO	115							MONITORING WELL INSTALLATION			
Sample No	Type Sample	Type Sample Sampling Distance Recovery Blows/ft. Unconfined Compressive Strength-lbs./ft.² Water Content-%						Unified Class. Symbol	Depth	Elevation	SURFAC	Description E ELEVATION = 9		
	712		<u> </u>				Dry Density- Ibs./ft. ³				3011110	6" TOPSOIL		
	PA 715													
				<del></del>								CLAYEY SILT	:	
	Aq ZIC								5_=		(5.0')	Brown to Brown	i Gray	
									huduuluuluukuuluuluuluul		(5.0')	BOTTOM OF BORI		
	THE	STRA	TIFICATI	ON LINES F	REPRESENT	THE APPRO	XIMATE 8	OUNDA	RY LINES BE	TWEEN SO	IL AND ROCK TO	YPES IN-SITU, THE TRANSITION	MAY BE GRADUAL.	
					RVATIO		<b>⊣</b>		icon Con			BORING STARTED	4-13-84	
W.L.	<del></del> +							De	raiis Cedar es Moines : Kansas City	Storm Lak	e, IA	BORING COMPLETI		
W.L.				B.C.R	.]	A.C.R	-		Omah Oklahoma Cit	a, NE		APPROVED RKL	FOREMAN JAF JOB # 783563-1	
** · L .	i.						. I			, · · · · · sa.	- · ·	LULINOAED KKT	<u> </u>	

r															
<u></u>	LOG OF BORING NO. 13  OWNER  CENTRAL QUALITY INDUSTRIES  VATES & AUBERLE														
1			711#1 ·	TTV ===	ירוירידי					1					
	INTR	AL (	ĮU.AL.	I I Y IN	DUZ I K	IF2			PROJECT NAME						
1	)Li).	711	INO	rc				1	MONITORING WELL INSTALLATION						
	/ bod st. a.		1111/		~		<del></del> -			<del></del>	DITTORING WELL	INSTALL	KITON		
Sample No	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft. ²	Water Content-%	Dry Density- Ibs./ft.3	Conflied Class.	Depth	Elevation	SURFACE ELEV		96.2		
	AS PA							UL.			2 51) GRAVEL A	AND ORGA	ACE SAND, NICS (PROBABLE		
2	XS										FILL) D	ark Brow	n		
1 1	PA AS							CL	5		5.0') Brown	SILT			
1 1	AS .							CI					G		
									=						
	}		İ					}	$\exists$	1			}		
}			ľ						三				į		
l	THE STRATIFICATION LINES REPRESENT THE APPRO								BY   WEE BE	TWEEN SO	AND BOCK TYPES IN SITU	THE TRANSITION	MAY BE GRADUAL		
							·						4-13-84		
W.L.				OBSE			_	Cedar F	con Con	Rapids I	evenport BORING	STARTED COMPLETE			
W.L.	<u>n</u>	<u>one</u>		DR W.D. B.C.R		A.C.R.	1		es Moines S Kansas City		·^	2A	FOREMAN JAF		
W.L.	. <b></b>			J. V N	т	F. C.N.	1	c	Omah klahoma Cit		<del> </del>		JOB #783563-1		

[								1	OG OF I	ROBIN	ic NO	14	
-	WINE	R							OG OF I		CHITECT-E		
1			IJAI T	TY IN	DUSTRI	ES				1	ATES & A		
S	ITE:				<u> </u>				·	PR	OJECT NAM	AE	
PO	LO,	ILL	INOI	S	<del>,</del>			,		M	ONITORIN	NG WELL INSTALL	ATION
Sample No.	Type Sample	Sampling Distance Recovery Blows/ft. Unconfined Compressive Strength-lbs/ft.²					Dry Density- Ibs./ft.3	Unified Class. Symbol	Depth	Elevation	SURFA	Description  CE ELEVATION =	
1	ST	24						CL CH	=			ILL-MIXTURE CLA RUSHED LIMESTON	
		$\vdash$		<b> </b>								ark Brown to Br	
3	ST ST	_18 18					<del></del>	CL_	5			LAYEY SILT rown to Gray	
		STRAT						BOUNDA	TITITITITITITITITITITITITITITITITITITI		DIL AND ROCK T	OTTOM OF BORING	MAY BE GRADUAL
	VAT				RVATIO		-1		con Con		•	BORING STARTED	4-13-84
W.L.	_2.		W.S.	OR W.D			-1	D	runs Cedar es Moines S Kansas City	Storm Lak	ce, IA	BORING COMPLETE	
W.L.		<del></del>		B.C.R	<u>.1                                    </u>	A.C.R	+		Omah Oklahoma Cit	a, NE		RIG Hand Auger APPROVED RKL	FOREMAN JAF JOB # 783563-1

M	lajor divis	si ons	Group symbols	Typical names		Laboratory classification	criteria
	ion	Clean gravels ttle or no fines)	GW	Wall-graded gravels, gravel-sand mixtures, little or no fines	grained	$C_0 = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c$	$\frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
_	Gravels f of coarse fract No. 4 sleve size	]	GP	Poorly graded gravels, gravel- sand mixtures, little or no fines	size), coerse	Not meeting all gradation re	equirements for GW
X sieve size)	Grevels (More than half of coerse fraction larger than No. 4 sieve size	with fines libie amount lines)	GM	Silty gravels, gravel-sand-silt mixtures	ize curve. 3n No. 200 sieve size), coarse-gra .GW, GP, SW, SP .GM, GC, SM, SC .Borderline cases requiring dual symbols	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P. between 4 and 7 are box
then No. 20	(More	Gravels with fines (Appreciable amount of fines)	GC	Clayey gravels, gravel-sand-clay mixtures	gravel from grain-size curve, raction smaller than No. 20  Taction smaller than No. 20  GW, GP, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GM, GC, GC, GM, GC, GM, GC, GC, GM, GC, GC, GC	Atterberg limits above "A" line with P.I. greater than 7	derline cases requiring us of dual symbols
Coerse grained sous (More than half of material is larger than No. 200 sieve size)	ze)	Clean sands (Little or no fines)	sw	Well-graded sands, gravelly sands, little or no fines		$C_0 = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{60}}{D_{10}}$	(D ₃₀ ) ² O ₁₀ XO ₆₀ between 1 and 3
n haif of mai	Sands half of coarse fraction han No. 4 sieve size)	Clean (Little or	SP	Poorly graded sands, gravelly sands, little or no fines	s of sand and age of fines follows:	Not meeting all gradation re	quirements for SW
(More than	Sands (More than half of o is smaller than No.	Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures	termine percentages of pending on percentage Is are classified as folio Less than 5 per cent. More than 12 per cent. 5 to 12 per cent	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4
	(Mor	Sends with (Appreciable a of fines)	sc	Clayey sands, sand-clay mix- tures	Determine per Depending on soils are classif Less than 5 More than 1 5 to 12 per	Atterberg limits above "A" line with P.I. greater than 7	and 7 are borderline cases requiring use of dual symbols.
		than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clay- ey fine sands or clayey silts with slight plasticity	60		
200 sieve)		(Liquid Ilmit less th	CL	Inorganic clays of low to me- dium plasticity, gravelly clays, sandy clays, silty clays, lean clays	50 soils and grained: Atterbe	erg Limits plotting in area are borderline classi-	СН
iis er than No.	<i>,</i>	(Liquid	OL	Organic silts and organic silty clays of low plasticity	40 symbols Equation PI=0.	requiring use of dual	
Fine-greined soils naterial is smeller		. then 50)	МН	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	20 30	, , ,	)H and MH
Fine-grained soils (More than half of material is smaller than No. 200 sieve	Siks and clays	limit greater	СН	Inorganic clays of high plas- ticity, fat clays	10	CL	
(More than		(Liquid	ОН	Organic clays of medium to high plasticity, organic silts	0	ML and OL 20 30 40 50 60	70 80 90 100
	Highly	slios	Pt	Peat and other highly organic soils	TEDO	Liquid Limit Plasticity Chart ACON CONSULTANTS	e inc

### APPENDIX_B

Soil Sampling Analysis Results



4140 LITT DRIVE

HILLSIDE, ILLINOIS 60162 - 1183

EARL I ROSENBERG President

June 1, 1984

H.R. THOMAS, JR. Director

John Yates & Associates 320 South Sunset Avenue La Grange, Illinois 60525

Attention: Mr. John Yates

Re: Terracon Consultants, Inc.

Davenport, Iowa - Soil Samples

Samples Received:	4/25/84	рН	Lead (ppm)	(ppm) Chrom-Total	<pre>£ppm as CaCD3)    Alkalinity</pre>
S/L #4350 Sample	#B5A-2	7.6	/ 0.10	/ 0.10	1086
S/L #4351 Sample		7.1	7 0.10	7 0.10	1809
S/L #4352 Sample		6.9	<u>7</u> 0.10	<u>7</u> 0.10	1428
S/L #4353 Sample	#B6A-2	8.1	/ 0.10	/ 0.10	7118
S/L #4354 Sample		8.3	7 0.10	7 0.10	20725
S/L #4355 Sample		8.1	7 0.10	7 0.10	2276
S/L #4356 Sample	<b>#</b> B7A <b>-</b> 2	7.8	/ 0.10	/ 0.10	3619
S/L #4357 Sample		6.85	7 0.10	7 0.10	1130
S/L #4358 Sample		6.5	7 0.10	<u>7</u> 0.10	1010
S/L #4359 Sample	#B-10-2	8.3	/ 0.10	/ 0.10	19268
S/L #4360 Sample		7.4	7 0.10	7 0.10	4540
S/L #4361 Sample		7.3	<u>7</u> 0.10	7 0.10	2642
S/L #4362 Sample	#B-11-2	7.3	/ 0.10	/ 0.10	1761
S/L #4363 Sample		6.95	7 0.10	7 0.10	1015
S/L #4364 Sample		8.0	<u>7</u> 0.10	7 0.10	19034
S/L #4365 - Sample	#B-12-2	7.5	/ 0.10	/ 0.10	1046
S/L #4366 - Sample		7.7	7 0.10	7 0.10	16526
S/L #4367 - Sample		7.9	<u>7</u> 0.10	<u>7</u> 0.10	19569
S/L #4368 - Sample	#B-13-2	7.6	/ 0.10	/ 0.10	7112
S/L #4369 - Sample		7.5	7 0.10	7 0.10	2734
S/L #4370 - Sample		6.85	7 0.10	7 0.10	1323
S/L #4371 - Sample	#8A-2-2-3-5	7.55	/ 0.10	/ 0.10	4148
S/L #4272- Sample		6.5	/ 0.10	/ 0.10	1015
S/L #4373 - Sample		6.6	<u>/</u> 0.10	/ 0.10	907

(Continued)

Johr Yates & Associates June 1, 1984 Page 2

Samples Received:	4/25/84	рН	Lead (ppm)	(ppm) Chrom-Total	(ppm as CaCO ₃ ) Alkalinity
S/L #4374 - Sample	#9A-2-2-3-5	7.4	/ 0.10	/ 0.10	2334
S/L #4375 - Sample		5.3	7 0.10	7 0.10	404
S/L #4376 - Sample		5.9	<u>7</u> 0.10	<u>7</u> 0.10	255
S/L #4377 - Sample	#14-2 2-3-5	7.75	/ 0.10	/ 0.10	3640
S/L #4378 - Sample		7.4	7 0.10	7 0.10	1848
S/L #4379 - Sample		7.5	<u>7</u> 0.10	<u>7</u> 0.10	753

ANALYSIS CERTIFIED BY:

, Director(HRT/ak) Retyped

ሪ



4140 LITT DRIVE

HILLSIDE, ILLINOIS 60162 - 1183

EARL ROSENBERG President

May 10, 1984

H.R. THOMAS, JR. Director

John Yates & Associates 320 South Sunset Avenue La Grange, Illinois 60525

Attention: Mr. John Yates

Re: Terracon Consultants, Inc.
Davenport, Iowa - Soil Samples

Samples Received:	4/25/84	ρΗ	Lead (ppm)	(ppm) Chrom-Total	(ppm as CaCO3 Alkalinity
S/L #4350 - Sumple	#B5A-2	7.6	21.0	15.0	1086
S/L #4351 - Sample		7.1	13.0	14.0	1809
S/L #4352 - Sample		6.9	12.5	16.5	1428
S/L #4353 - Sample	#B6A-2	8.1	18.0	16.5	7118
S/L #4354 - Sample		8.3	66.5	31.5	20725
S/L #4355 - Sample		8.1	16.6	22.0	2276
S/L #4356 - Sample	#B7A-2	7.8	60.5	23.0	3619
S/L #4357 - Sample		6.85	35.0	21.0	1130
S/L #4358 - Sample		6.5	16.5	22.0	1010
S/L #4359 - Sample	#B-10-2	8.3	30.5	16.5	19268
S/L #4360 - Sample		7.4	15.5	15.5	4540
S/L #4361 - Sample		7.3	8.5	16.5	2642
S/L #4362 - Sample	#B-11-2	7.3	69.0	18.5	1761
S/L #4363 - Sample		6.95	7.5	6.0	1015
S/L #4364 - Sample		8.0	14.5	17.0	19034
S/L #4365 - Sample	#B-12-2	7.5	13.0	17.5	1046
S/L #4366 - Sample		7.7	12.0	9.00	16526
S/L #4367 - Sample		7.9	17.0	14.0	19569
S/L #4368 - Sample S/L #4369 - Sample S/L #4370 - Sample	#B-13-2 #B-13-3	7.6 7.5 6.85	455 62.5 44.5	91.0 17.0 16.5	7112 2734 1323
S/L #4371 - Sample	#8A-2_2_3_5	7.55	32.5	610	4148
S/L #4372 - Sample		6.5	8.5	6.0	1015
S/L #4373 - Sample		6.6	12.0	14.5	907

(Continued)

John Yates & Associates Máy 10, 1984 Page 2

Samples Received: 4/25/8	34	ρН	Lead (ppm)	(ppm) Chrom-Total	(ppm as CaCO ₃ ) Alkalinity
S/L #4374 Sample #9A-1	2-3-5	7.4	39.0	20.5	2334
S/L #4375 Sample #9A-2		5.3	14.5	16.5	404
S/L #4376 Sample #9A-3		5.9	24.0	37.0	255
S/L #4377 Sample #14-1	2-3-5	7.75	28.5	29.0	2640
S/L #4378 Sample #14-2		7.4	14.5	12.0	1848
S/L #4379 Sample #14-3		7.5	22.0	19.0	753

ANALYSIS CERTIFIED BY: ______, Director(HRT/ak)

### APPENDIX_C

Stream Sample
Analysis Results

**CHEMICAL ANALYSTS SINCE 1936** 

**ANALYSIS REPORT** 

NO. #5429, #5430, #5431

4140 LITT DRIVE . Phone 312/544-3260 . HILLSIDE, ILLINOIS 60162

ANALYSIS CERTIFIED BY:

Certifications: U.S.D.A. #1783 • III. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50296 • III. EPA #100191

John Yates & Associates Attn: Mr. John Yates 320 South Sunset Avenue la Grange, Illinois 60525

P.O	No	_
	· · · · · · · · · · · · · · · · · · ·	

Sample Recd	5/22/84	ļ	-	Tests Completed6/	1/84		
	<u> </u>			FORMATION			
Source Re: Terracon C	onsultant	s, P.O. Bo	× #2025,	Davenport, IA. 5280	9, Job #78.	3563-1	
#5429 - Upstrea	m, Proj.	Polo, 5/18	/84				
#543U - Midstre	am, Proj.	Po10, 5/1	8/84				
#5431 - Downstro	eam, Proj	. Polo, 5/	18/84		(+) by	HGA	
	V						
Sampling Method: By Client		_ By Sub. Lab				Other	
			ANA	LYSIS			
	#5429	#5430	<i>#</i> 5431		#5429	#5430	#5431
Total Solics mg/1		<del> </del>		Nitragen-Tot mg/	<del>                              </del>		
Fig. Tot. Sol. mg/1	<del></del>	<del>                                     </del>		Nitrogen-Amm mg/	<del></del>	<del></del>	<del> </del>
Vol. Tot. Sol. mg/1		1	<del></del>	Nitrogen-Org mg/1	<del></del>	<del></del>	<del> </del>
Diss. Solicis mg/f	660	540	576	Nitrite mg/1		<del></del>	<del> </del>
Settle, Sal. ml/l		1		Nitrate mg/1	<del></del>		<del></del>
Tot. Sus. Sol. mg/1			<del></del>	Phosphate (Total) mg/l	<del></del>		<b>f</b>
Fin. Sus. Sol. mg/1		1		Phosphate (Ortho) mg/l	1		
Val. Sus. Sol. mg/1				Sulfate mg/1			
				Sulfide mg/l			
BOD mg/i				Sulfite mg/1			
COD mg/l	105	37	27	Aluminum mg/I			
DO mg/1		<b> </b>		Antimony mg/l			
2		<del> </del>		Arsenic mg/I	<u> </u>		<b> </b>
Phanals ug/I		<del> </del>	·	Barium mg/1	<del> </del>		
MBAS mg/1		<del> </del>		Beryllium mg/l	<del></del>		
Oils & Grasses mg/1		<del> </del>		Boron mg/l	<del> </del>		<u> </u>
Tot. Bact. Cells/100 ml		<del> </del>		Cadmium mg/l	<del> </del>		
Tot. Coli. Cells/100 ml		<del> </del>	(+)	<del> </del>	0.005	0,001	/ 0 001
Feral Coli. Cells/100 ml		1		Chrom-Hex. mg/l	0.007		<u> </u>
		<del>                                     </del>	<del></del>	Chrom-Tri. mg/1	<del> </del>		
pH	7.0	7.3	7.7	Copper mg/l	<del> </del>		
Spec. Cond. unnhos/cm	1000	880	920	Iron mg/l	<del>                                     </del>		
Alkalinity mg/l as CaCO3	444	370	458(+)		0.006	0,005	0.003
Acidity mg/l as CaCO3				Lithium mg/l			
Tot. Hard. mg/l as CaCO3				Magnesium mg/l			
Resid. Cl ₂ mg/I				Manganese mg/l			
Bromide mg/I				Mercury ug/1			
Chloride mg/1				Nickel mg/1			
Fluorida mg/l				Potassium mg/l			
Cyanide-Total mg/I				Silver mg/l			
Cyanide-Free mg/l				Sodium mg/1			
				Strontium mg/l			
				Tin mg/1	<b> </b>  -		
		!	i	Zinc mg/l	1 1	ľ	

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition

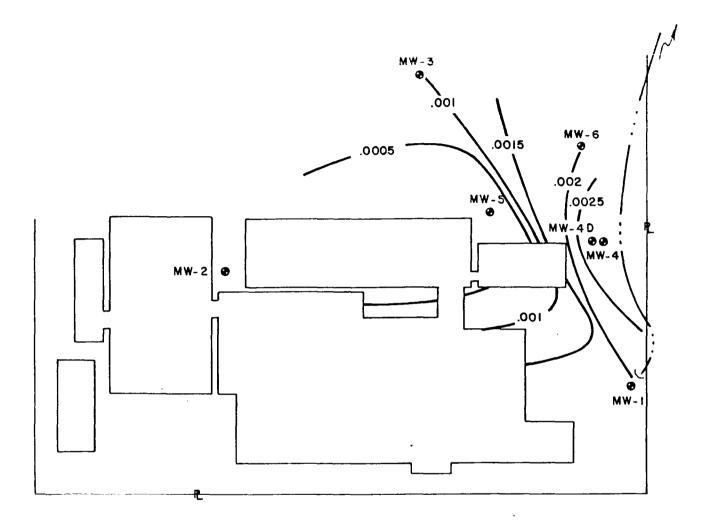
_, Director

Retyped 7/19/84

### APPENDIX_D

Groundwater

Isocons



Scale I"=100'

Date 7-11-84

Drawn By J.M.

Monitoring Well

Ditch

M. Rapps Associates, Inc.

Environmental

Engineering

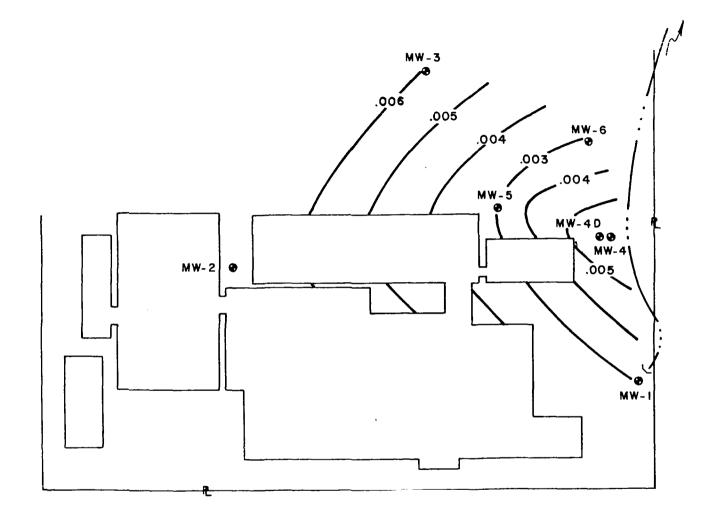
# CHROMIUM (total)

(mg/I)

Groundwater

5 - 18 - 84

PLATE 7.



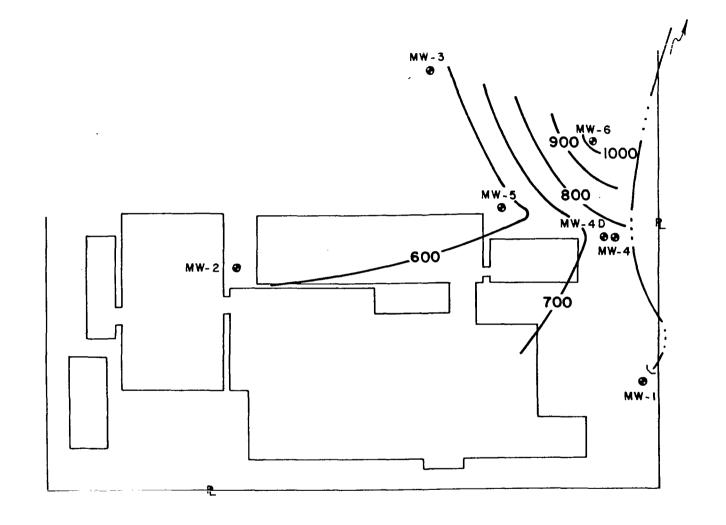
Scale |" = 100' Date 7-11-84 Drawn By J.M. ● Monitoring Well Ditch

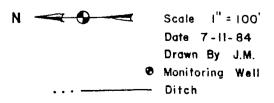
M. Rapps Associates, Inc. Environmental Engineering

# LEAD

(mg/l) Groundwater 5-18-84

PLATE 8.

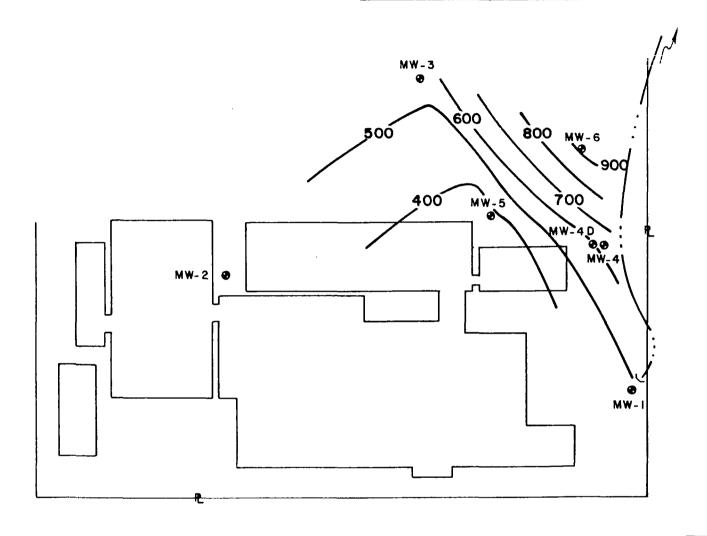




M. Rapps Associates, Inc.
Environmental Engineering

T.D.S. (mg/1) Groundwater 5-18-84

PLATE 9.



Scale 1"=100'

Date 7-11-84

Drawn By J.M.

Monitoring Well

Ditch

M. Rapps Associates, Inc.
Environmental Engineering

### ALKALINITY

(mg/1)

Groundwater

5 - 18 - 84

PLATE 10.

### APPENDIX E

Groundwater Sample
Analysis Results

**CHEMICAL ANALYSTS SINCE 1936** 

NO. \$5432, \$5433, \$5434

**ANALYSIS REPORT** 

4140 LITT DRIVE . Phone 312/544-3260 . HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • III, Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50296 • III, EPA #100191

DO

Phenois

John Yates & Associates Attn: Mr. John Yates 320 South Sunset Avenue La Grange, Illinois 60525

mg/1

ug/I

P.O. No. _

Sample Recd. 5/22/84		34	7	Tests Completed		6/1 /84			
					FORMATION				
Source Re:	Terrac	on Consul	ltants, P.	0. Box #2	025, Davenport,	Ia. 5	2809, Job	#78356-J	<u> </u>
#54.32	#MW-1, 1	Proj. Pol	lo, 5/18/8	4					******
#54.33 #54.34	#MW-2, 1 #MW-3, 1	Proj. Pol Proj. Pol	lo, 5/18/8 lo, 5/18/8	4 4			(+	-) by HGA	
Sampling Method:	By Client	X	_ By Sub. Lal	bANAI	Serco Auto-Sa -YSIS	mpler		Other	
		<b>#5432</b>	#5433	#5434			. #5432	#5433	#5434
Total Solids	mg/i		1		Nitrogen-Tot	mg/I			<b></b>
Fir. Tot. Sal.	mg/I			T	Nitragen-Amm	mg/1		1	
Vol. Tot. 501.	mg/l				Nitrogen-Org	mg/l			
Diss. Solids	mg/l	764	576	556	Nitrite	mg/I			
Settle, Sol.	ml/I				Nitrate	mg/I			
Tot. Sus. Sol.	mg/1				Phosphote (Total)	mg/I			T
Fix. Sus. Sol.	mg/1				Phosphate (Ortho)	mg/I			
Vol. Sus. Sol.	mg/l				Sulfate	mg/I			†
				·	Sulfide	mg/i			
BOD	mg/1				Sulfite	mg/I		<del></del>	†
COD	mg/i	360	10	135	Aluminum	mg/I			<u> </u>

Antimony

Arsenic

Barium

mg/l mg/I

mg/i

mg/1 MBAS Beryllium mg/l Oils & Greases mg/I Boron mg/i Cadmium mg/l Tot. Bact. Cells/100 ml Calcium mg/l Tot. Coli. Cells/100 ml Chrom-Total ppm (+) **** 0.002 <u>/ 0.001</u> 0.001 Fecal Cali Cells/100 ml Chrom-Hex. mg/l Chrom-Tri. mg/l ρħ 7.1 7.1 7.4 Copper mg/l Spec. Cond. 1100 urnhos/cm 820 700 Iron mg/l Alkalinity mg/l as CaCQ3 470 462 538 (+ Lead mg/10.003 0.007 0.006 Acidity mg/l as CaCO3 Lithium mg/l Tot. Hard. mg/l as CaCO3 Magnesium mg/l Resid. Cla mg/l Manganese mg/l Bromide mg/I Mercury ug/I Chloride mg/1Nickel mg/l Fluoride mg/I Potassium mg/ICyanide Foral mg/I mg/l Silver Cyanide I ree mg/I Sodium mg/1Strontium mg/l Tin mg/l mg/IZinc

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition

نغ

Retyped Date _7/19/84 ___ak_

ANALYSIS CERTIFIED BY: . Director

**CHEMICAL ANALYSTS SINCE 1936** 

**ANALYSIS REPORT** 

P.O. No._

NO. #5435, #5436, #5437

4140 LITT DRIVE . Phone 312/544-3260 . HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • III. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50296 • III. EPA #100191

John Yates & Associates Attn: Mr. John Yates 320 South Sunset Avenue La Grange, Illinois 60525

6/1/84			

Sample Recd		5/22/84	SAM	Tests Cor		6/1/84
Source	Re: Terrac	on Consult	ants, P.O.	Box #2025,	Davenport,	Ia, 52809, Job #783563-1
#5435	- #MW-4, Pr	oj. Polo,	5/18/84			
	- #MW-4d Pro					(+) by HGA

Sampling Wethod: By Client	X	By Sub. Lal	b	Serco Auto-Sampler		_ Other	
				LYSIS			
	#5435	#5436	#5437		#5435	<b>#</b> 54 <b>3</b> 6	#5437
Total Salids mg/1				Nitrogen-Tot mg/I		†	
Fist. Tot. Sal. mg/l				Nitrogen-Amm mg/I			
Vol. Tot. 5al. mg/l				Nitrogen-Org mg/1			
Diss. Solids mg/l	760	752	552	Nitrite mg/l			
Seitle, Sal. ml/l				Nitrate mg/l			<u></u>
Tot. Sus. Sol. mg/1				Phosphate (Total) mg/1			
Fix. Sus. Sol. mg/1				Phosphate (Ortho) mg/1			
Val. Sus. Sal. mg/l				Sulfate mg/1	·····		· · · · · · · · · · · · · · · · · · ·
				Sulfide mg/I		†	······································
BOD mg/I				Sulfite mg/I		<del> </del>	
COD mg/l	743	46	368	Aluminum mg/I			
DO mg/l				Antimony mg/l		T	
				Arsenic mg/I		<u> </u>	
Phenois ug/i				Barium mg/1			
MBAS mg/l				Beryllium mg/l			
Oi s & Greases mg/1				Boron mg/I			
	· · · · · · · · · · · · · · · · · · ·			Cadmium mg/l	<del></del>	<del>                                     </del>	
To'. Boet. Cells/100 ml				Calcium mg/I			
To Coli. Cells/100 ml			(+)	Chrom-Total DDM 74500	0.002	0.003	/ 0.001
Feral Coli. Cells/100 ml				Chrom-Hex. mg/l			· ·
		1		Chrom-Tri. mg/1			
рН	6.9	6.9	6.9	Copper mg/I		<del>                                     </del>	
Spire. Cond. umhos/cm	1050	1080	800	Iron mg/I			
Alkalinity mg/l as CaCO3	622	568	358 (+		0.006	0.006	0.003
Acidity mg/l as CaCO3				Lithium mg/l	0.000	0.000	
Tot. Hard. mg/1 as CaCO3		1		Magnesium mg/l		<del>                                     </del>	
Resid. Cl ₂ mg/l		<del>     </del>		Manganese mg/l		†	
Bromide mg/I		1		Mercury ug/l		<del>   </del>	
Chloride mg/l		<del>                                     </del>		Nickel mg/l		†	
Fluoride mg/1		1		Potassium mg/1		<del>                                     </del>	
Cyanide- Total mg/1		<del>                                     </del>		Silver mg/1			
Cyanide-Free mg/1		<del>                                     </del>		Sodium mg/1			
		<del>   </del>		Strontium mg/1		<del>   </del>	

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition. Retyped

Tin

Zinc

mg/l

mg/l

ANALYSIS CERTIFIED BY: _, Director Date __7/19/84

**CHEMICAL ANALYSTS SINCE 1936** 

4140 LITT DRIVE . Phone 312/544-3260 . HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • III. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50296 • III. EPA #100191

42m-r0

NALYSIS CERTIFIED BY:

John Yates & Associates Attn: Mr. John Yates 32C South Sunset Avenue La Grange, Illinois 60525

١.	Reg.	#50296	•	III. EPA #100191
_				

ANALYSIS REPORT

P.O. No. ____

Retyped Date: <u>7/19/84</u>

*#*5438

ample Recd	5/22/84		Tests Completed 6/			/1/84	1/84		
		S	AMPLE IN	FORMATION					
ource Re: Terrac	on Consul	tants, A.O.	. Box #2	2025, Davenport,	Ia.,	Job #783:	563-1		
					- <del></del>		<del></del>		
#5438 - #MW-6,	Froj. roa	0, 3/10/04							
					(+	) by HGA	·		
	X					<del></del>			
ampling Method: By Client		By Sub. Lab.,	ΔΝΔ	Serco Auto-Sai LYSIS	mpler		_ Other	· <del></del>	
	T	<del> </del>		1	<del></del>		<del></del>	<del></del>	
	<i>#</i> 5438					<b>#543</b> 8		!	
Total Solids mg/1	l			Nitrogen-Tot	mg/i		1		
Fix Tat. Sal. mg/l				Nitrogen-Amm	mg/l				
Vol Tot. Sol. mg/l				Nitragen-Org	mg/l				
Diss. Solids mg/l	1024			Nitrite	mg/i				
Settle, Sol. ml/l				Nitrote	mg/l		T		
Tot. Sus. Sol, mg/1				Phosphate (Total)	mg/l				
Fix. Sus. Sol. mg/l				Phosphate (Ortho)	mg/1				
Vol. Sus. Sol. mg/l				Sulfate	mg/l		<u> </u>		
				Sulfide	mg/l		<u> </u>		
801) mg/1				Sulfite	mg/I		L		
COD mg/1	1267			Aluminum	mg/l				
DO mg/I				Antimony	mg/l				
				Arsenic	mg/l				
Phenois ug/I				Barium	mg/i		<u> </u>		
MBAS mg/1				Beryllium	mg/l		<u></u>		
Oils & Greases mg/1			·	Boron	mg/i		<u> </u>		
				Cadmium	mg/l				
Tot Bact. Cells/100 ml				#	mg/l	· · · · · · · · · · · · · · · · · · ·	<u> </u>		
Tot Cali. Cells/100 ml			(+)	Chrom-Total ppm	xxxx	0,002			
Fecal Coli Cells/100 ml				Chrom-Hex.	mg/l				
				Chrom-Tri.	mg/l				
рН	7.1			Copper	mg/l				
Spec. Cond. umhos/cm	1400			Iron	mg/i				
Alkalinity mg/l as CaCO3	928		(+)	Lead PPM	xwxk	0.003			
Acid ty mg/l as CaCO3				Lithium	mg/l				
Tot. Hard. mg/l as CaCO3				Magnesium	mg/l				
Resid. Cly mg/l				Manganese	mg/i				
Bromide mg/I				Mercury	ug/1				
Chloride mg/1				Nickel	mg/I				
Fluoride mg/1				Potassium	mg/I				
yan da- Total mg/l			<del></del>	Silver	mg/i				
Cycnide-Free mg/1	1			Sodium	mg/I				
			·····	Strontium	mg/I				
				Tin	mg/I			1	
				7: ^	/-			1	

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition.

., Director